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THE NEW BEDFORD REGIONAL AIRPORT:

ECONOMIC SIGNIFICANCE OF THE PROPOSED AIRPORT EXPANSION

GOVERNMENT DOCUMENTS
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Prepared for

The New Bedford CEO Club

by

Clyde W. Barrow, Director

CENTER FOR POLICY ANALYSIS
University of Massachusetts Dartmouth

January 1995

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EXECUTIVE SUMMARY

This report estimates the current and potential economic signficance of New Bedford Bedford Regional Airport using a standard model recommended by the United States Department of Transportation. Economic significance is estimated by quantifying the *transportation benefits* and *economic impacts* of various expansion scenarios recommended in the Phase I Master Plan for New Bedford Regional Airport. Transportation benefits are defined as the *time-saved* and *cost-avoided* by air travelers enplaning at New Bedford Regional Airport instead of the next best alternative airport. Economic impacts are defined as the *annual employment* and *payroll earnings* attributable to aviation activity at New Bedford Regional Airport.

The annual transportation benefits attributable to New Bedford Regional Airport under various scenarios are:

* Current = $1,076,999,

* Low-Growth Scenario (incremental growth in commuter air service to the Islands and in general aviation activity) = $1,736,788,

* Moderate-Growth Scenario (limited commuter air service to New York City) = $2,076,804,

* High-Growth Scenario (shuttle service to New York City) = $9,401,203.

The annual regional total economic impacts attributable to New Bedford Regional Airport under various scenarios are:

* Current = 181 full- and part-time jobs with annual earnings of $3,467,926,

* Low-Growth Scenario (incremental growth in commuter air service to the Islands and in general aviation activity) = 233 full - and part-time jobs with annual earnings of $4,508,938,

* Moderate-Growth Scenario (limited commuter air service to New York City) = 311 full- and part-time jobs with annual earnings of $5,877,206,

* High-Growth Scenario (shuttle service to New York City) = 428 full- and part-time jobs with annual earnings of $9,242,633,

* Air Cargo Service = an additional 276 full- and part-time jobs with annual earnings of $6,482,440 added to any of the above scenarios,

* Casino/Tourism = 54 full- and part-time jobs with annual earnings of $1,198,625 added to any of the above scenarios,

* Construction and Physical Improvements = 1,894 full- and part-time (temporary) jobs with total earnings of $47,509,459.

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1.00 PURPOSE OF THE REPORT

The New Bedford Airport Commission adopted a formal *Mission Statement* in 1993 which established the goal of making the New Bedford Regional Airport (EWB) "the aviation hub of Southeastern Massachusetts" (Edwards and Kelcey 1994). Achieving this strategic goal will require the airport to position itself as a regional operations center for a major air freight carrier and as a regional departure and arrival point for commuter passenger traffic connecting to New York City and other major air traffic hubs. The technical feasibility of achieving this goal will depend on certain physical improvements to the airport that must be approved by a variety of state and federal agencies including the Federal Aviation Administration, the Massachusetts Aeronautics Commission, the U.S. Environmental Protection Agency, the Massachusetts Department of Environmental Protection, and the U.S. Army Corps of Engineers.

As a first step toward securing this approval, the New Bedford Airport Commission employed Edwards and Kelcey, Inc. to develop a Phase I Master Plan. The Master Plan surveys existing facilities, as well as historical trends in airport traffic, and forecasts that airport traffic could triple from 14,600 enplanements in 1992 to 44,174 enplanements by the year 2013. Consequently, the Master Plan recommends several physical improvements to the airport that would allow it to meet forecasted increases in air traffic potential. The Master Plan was accepted by the Federal Aviation Administration on February 24, 1994. The FAA authorized airport officials to initiate selected components of Phase II Design on May 13, 1994(Barrow 1994).

As an interested party, the New Bedford CEO Club has requested that the University of Massachusetts Dartmouth Center for Policy Analysis prepare a report estimating the potential regional economic significance of the proposed airport expansion. The University of Massachusetts Dartmouth agreed that Dr. Clyde W. Barrow, Department of Political Science and Director of the Center for Policy Analysis, would serve as principal investigator on the project, pursuant to a formal agreement between the New Bedford CEO Club and the University of Massachusetts Dartmouth. The principal investigator agreed to:

1. estimate the current and potential transportation benefits of the proposed expansion Regional Airport, based on passenger data and forecasts developed in the Phase I Master Plan,
2. estimate the current and potential economic impacts of the proposed expansion, based on passenger data and forecasts developed in the Phase I Master Plan,

3. prepare a written report of the findings for incorporation into an audio-visual presentation to be developed by the manager of the New Bedford Regional Airport.

It was agreed that an oral presentation of the findings would be presented on January 17, 1995 and that a final written report would be completed no later than January 27, 1995.

2.00 DESCRIPTION OF THE NEW BEDFORD REGIONAL AIRPORT

2.10 Physical Characteristics of the Airport

The site of the New Bedford Regional Airport (EWB)[1] contains slightly less than 800 acres. The Airport includes two runways, approximately 5000 feet in length, that are sufficient for general aviation and light commuter traffic. Runway 5-23 is the main runway. It is equipped with an Approach Lighting System (ALS) for nighttime landings and an Instrument Landing System (ILS) for bad weather and other poor visibility landings. Runway 14-92 is the cross-wind runway.[2] There are also six taxiways lettered F. For the purposes of airport improvement, the most important taxiways are Taxiway A which is parallel to runway 5-23, Taxiway B which is parallel to runway 14-92, and Taxiway F which currently connects runway 5-23 to Taxiway A. Finally, the New Bedford Regional Airport has a Traffic Control Tower. Importantly, this makes EWB 5-23 the only towered ILS civilian runway in Southeastern Massachusetts.[3]

2.20 Airport Traffic

The airport currently services general aviation traffic, commuter passenger traffic to Martha's Vineyard and Nantucket Island, and limited air freight traffic. Total enplanements at EWB declined from a historic peak of 51,440 in 1984 to 14,600 in 1992. In 1993, scheduled passenger enplanements increased for the first time in a decade to 17,457.

2.30 Air Industrial Park and Foreign Trade Zone

Approximately twenty-three (23) acres of the airport site are set aside as an Air Industrial Park (AIP), while another 22.4 acres have been designated as a Foreign Trade Zone (FTZ). The Foreign Trade Zone is one of only two federally-designated FTZ's in Massachusetts. The other is attached to Logan Airport in Boston. Access to the FTZ is provided by Airport Road. Basic utilities are already in place for the FTZ.

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[1] All airports are assigned a three or four letter identification code. The identification code for the New Bedford Regional Airport is EWB.

[2] Aircraft take-off into the wind. Therefore, in accordance with FAA regulations, a cross-wind runway is maintained at EWB.

[3] Otis Airforce Base has the only other towered ILS runway in Southeastern Massachusetts.

Foreign Trade Zones allow companies within a 90-mile radius to import goods duty-free if certain conditions are met. Where such zones have been activated and implemented elsewhere in the country, they have attracted foreign investment and have typically stimulated an additional $200 million to $300 million in additional economic activity. The Foreign Trade Zone was technically activated by the establishment of a seven-member Foreign Trade Zone Corporation of New Bedford. However, the FTZ is still not a functioning operation and the federally-designated status will expire within the next two years if not formally activated within that time-frame. Once the FTZ designation expires, it may be transferred to another municipality within the state or even to another state.

2.40 Airport Access

The New Bedford Regional Airport is located near the intersection of Route 140 and Interstate 495. There is no direct access to EWB, the AIP, or FTZ from either highway. The main access route is to exit Route 140 onto Shawmut Avenue. Shawmut Avenue provides access to the Airport.

3.00 CAPACITY EXPANSION AT NEW BEDFORD REGIONAL AIRPORT

3.10 State Policy

Soon after its election to office in 1990, the Weld Administration initiated an airport site selection process with the intention of constructing a second major airport somewhere along the perimeter of the I-495 loop. The purpose of the second airport was to divert general aviation and cargo traffic (and with it highway congestion) away from Logan Airport in Boston. Among the ten final sites selected for consideration, Lakeville was the final site located in Southeastern Massachusetts. However, the Lakeville site was considered an unlikely location due to early citizen opposition. The geographic, financial, and political difficulties of finding an acceptable site large enough to accommodate a second major airport have led the Weld Administration and the Massachusetts Aeronautics Commission to revise its original aeronautics plan. While the original objective remains the same, the state Administration now seeks to divert traffic from Logan Airport by transferring it to designated regional airports throughout the state (Arthur D. Little, Inc. 1993).

3.20 Name Change.

In 1993, the New Bedford Airport Commission changed the name of the New Bedford Municipal Airport to the New Bedford **Regional** Airport as a symbol of its aspiration to become the aviation hub of Southeastern Massachusetts.

3.30 Master Plan

In 1993, the New Bedford Airport Commission hired Edwards and Kelcey, Inc. of Boston, Massachusetts to prepare a Phase I Master Plan. The Master Plan surveys existing facilities, historical trends in airport traffic, and forecasts that potential airport traffic could triple from 14,600 enplanements in 1992 to 44,174 enplanements by the year 2013. Consequently, the Master Plan recommends expanding the air traffic capacity of EWB to meet the forecasted increases in air traffic potential. The Master Plan was accepted by the Federal Aviation Administration on February 24, 1994.

The Master Plan recommends several airport improvements designed to enhance EWB's air traffic capacity. These recommendations include:

1. The extension of runway 5-23 (westward) by additional 3000 feet. The proposed extension would increase the total length of the runway from 5000 to 8000 feet. Importantly, such an extension would allow landings and takeoffs by every type of jet aircraft except wide-body aircraft (i.e., no 747s or DC-10s). This includes standard passenger aircraft such as the Boeing 727 and 737, the McDonnell Douglas DC-8, and Fokker 100. It would also accommodate the anticipated replacements for these aircraft such as the Boeing 757 and 767. An 8000 ft. runway would allow 100% of such aircraft to land and takeoff at 90% of load capacity.
2. The realignment and extension of Taxiway A for runway 5-23 to a total length of 8000 feet.
3. The construction of a new Taxiway F (parallel to runway 14-92 and south of Runway 5-23) for access to the Foreign Trade Zone and Air Industrial Park.
4. Other miscellaneous and related improvements.

The Master Plan estimates that the total cost of recommended improvements is $9 million to $10 million. However, environmental mitigation makes it more likely that the total cost is $30 million. If the proposed improvements are approved by all relevant state and federal agencies, these Phase III Construction costs would be largely defrayed by a ninety per cent (90%) grant from the Federal Aviation Administration's Airport Improvement Program and by a seven percent (7%) grant from the Massachusetts Aeronautics Commission. The City of New Bedford would be required to cover the remaining three percent (3%) of costs or approximately $900,000 of the projected $10 million cost.

3.40 Air Industrial Park and Foreign Trade Zone Activation

Direct improvements to the Air Industrial Park and the Foreign Trade Zone are not eligible for federal or state funding. Consequently, these components of the Airport Master Plan are not part of any grant applications to the Federal Aviation Administration. However, the Master Plan regards the AIP and activation of the FTZ as important to actualizing EWB's potential air traffic capacity. At this time, it is not clear what steps are necessary to convert the FTZ into an operating entity, how a functioning FTZ should be organized, or even what the precise demand for the FTZ is for the New Bedford market area.

Yet, as formal plans for airport expansion encounter obstacles, the potential economic impact of an operating FTZ may become a crucial rationale for justifying the expansion of New Bedford Regional Airport. As a first step toward gathering this information, the Foreign Trade Zone Corporation will soon issue a Request for Proposals (RFP). The anticipated RFP will solicit proposals for a consultant to conduct a user survey of the New Bedford market area designed to assess the actual potential use of the FTZ should it be activated within the next two years.

4.00 METHODOLOGY

The United States Department of Transportation (USDOT) recommends a standard model for estimating the regional economic significance of airports. The model was first published under DOT sponsorship in 1986. It was republished with revisions in 1992 (Butler and Kiernan 1992, 1). The procedures described in the DOT model are useful for evaluating the economic significance of an existing or proposed airport or to study the consequences of increased activity at an existing airport. Moreover, the DOT model is particularly attractive for the purposes of this study because it was prepared specifically for small- to medium-sized public use airports with small staffs and limited budgets. Thus, the model includes some rule-of-thumb data for estimating the transportation benefit and economic impact of airport activities that reduces the cost of data collection. The DOT's standard model has been applied previously to a study of the national aviation industry (Wilbur Smith Associates 1993) and in two studies of regional airports in Florida (Florida Department of Transportation, n.d.) and New York (Genesee/Finger Lakes 1984). The previous studies were consulted in the design and preparation of this report.

4.10 Indicators and Market Area

The two main indicators of an airport's economic significance are its *transportation benefit* and its *economic impact*. An airport's transportation benefit is the service that an airport makes available to the surrounding area. Economic impact is the economic activity, employment, and payroll that can be attributed, directly and indirectly, to the operation of an airport (Butler and Kiernan 1992, 2).

The measurement of transportation benefits and economic impact requires the identification of the specific market area that is served by a particular airport. The simplest method for defining a market area is to equate it with the City or County in which the airport is located. A second method is to define the market area in terms of a specified drive-time radius (e.g., sixty minutes). A third method is to conduct passenger and cargo surveys that identify the origination points of actual passenger and cargo traffic (Edwards and Kelcey 1994, 2-1).

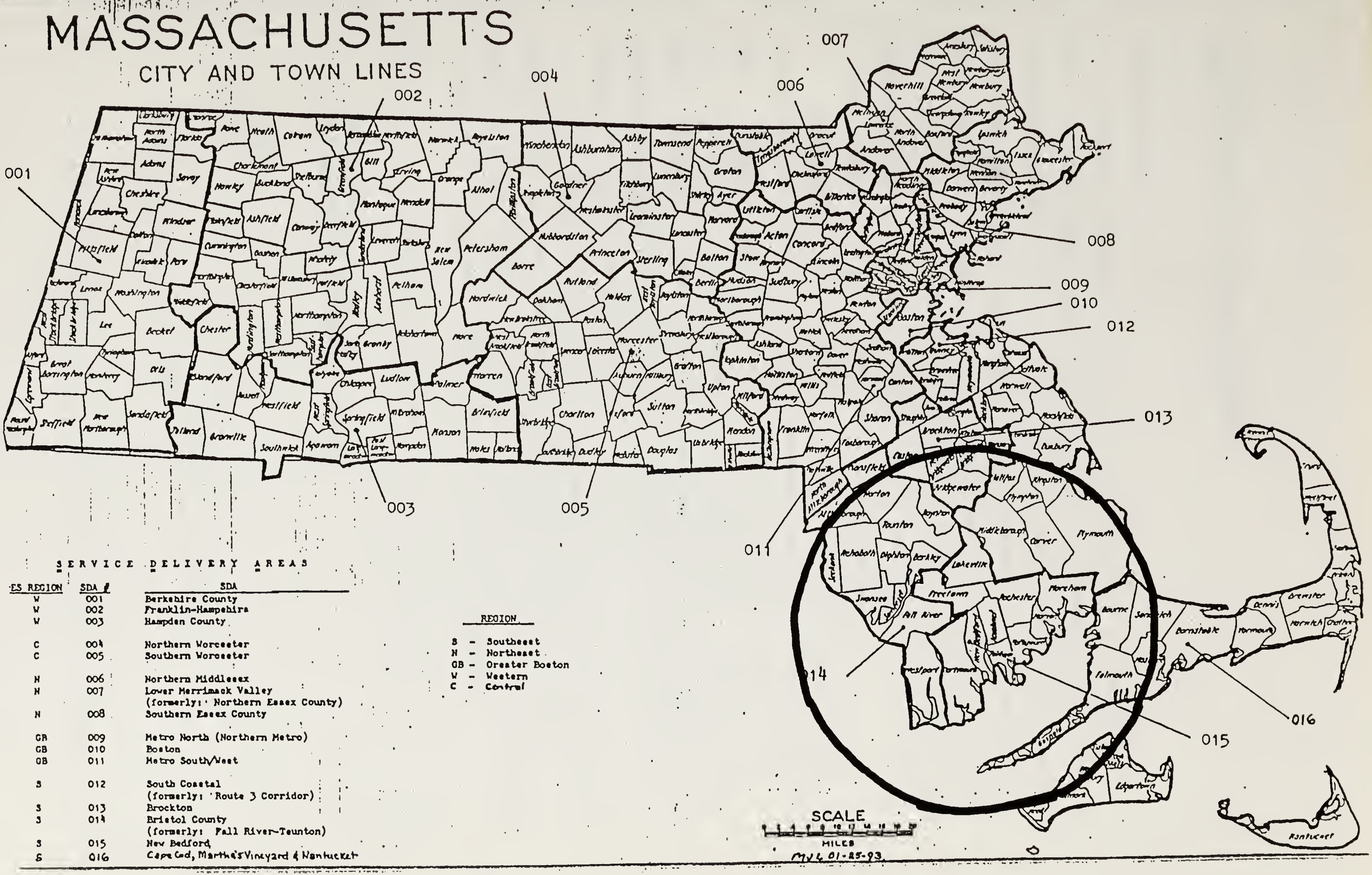
The first method was rejected for this study because it does not encompass the full area from which EWB might reasonably be expected to draw commuter passengers and air cargo. The third method was also rejected, primarily because the study is interested in potential traffic (as opposed to actual traffic) and, secondarily, because it was deemed too expensive. Thus, it was decided that a twenty-five (25) mile drive-radius best identifies EWB's potential market for reasons that are discussed below. The potential market area, defined as a twenty-five (25) mile drive-radius from New Bedford Regional Airport, is shown in Figure 1. This market area includes thirty-nine (39) municipalities with an estimated 1992 total population of 813,047 and a 1994 laborforce of 419,969 (Department of Revenue 1993; Department of Employment and Training 1994).

4.20 Sources of Data

The DOT standard model provides a more accurate estimate of economic significance to the extent that local data can be substituted for rule-of-thumb data. Thus, data obtained locally has been used wherever possible to replace or complement the model's rule-of-thumb data. Local data was obtained from the following sources:

- a mail survey of employers based at the New Bedford Regional Airport and its immediate vicinity. The survey was used to obtain current data on employment, payroll, local expenditures, and total sales attributable to aviation activity at New Bedford Regional Airport.
- Additional data on employment and earnings was obtained from the Massachusetts Department of Employment Training ES-202 File (Annual 1993).
- Data on the population of the New Bedford Regional Airport's service area was calculated from the 1992 municipal population estimates contained in the Massachusetts Department of Revenue On-line Municipal Data Bank (File Pop7092.WK1).
- The estimated multiplier effects for businesses operating in Massachusetts were obtained from the U.S. Department of Commerce RIMS II Input-Output Modeling System.
- Data on tourism, particularly average visitor expenditures and visitor points of origin, were obtained from the Bristol County Convention and Visitor's Bureau.
- Data on potential commuter passenger and air cargo traffic rely on information contained in the Phase I Master Plan Study for New Bedford Regional Airport (Edwards and Kelcey 1994).

FIGURE 1. NEW BEDFORD REGIONAL AIRPORT MARKET AREA



SERVICE DELIVERY AREAS

ES REGION	SDA #	SDA
W	001	Berkshire County
W	002	Franklin-Hampshire
W	003	Hampden County
C	004	Northern Worcester
C	005	Southern Worcester
N	006	Northern Middlesex
N	007	Lower Merrimack Valley (formerly: Northern Essex County)
N	008	Southern Essex County
GB	009	Metro North (Northern Metro)
GB	010	Boston
GB	011	Metro South/West
S	012	South Coastal (formerly: Route 3 Corridor)
S	013	Brockton
S	014	Bristol County (formerly: Fall River-Taunton)
S	015	New Bedford
S	016	Cape Cod, Martha's Vineyard & Nantucket

REGION

S - Southeast
N - Northeast
GB - Greater Boston
W - Western
C - Central

5.00 TRANSPORTATION BENEFITS

5.10 Definitions

The primary transportation benefits of a local airport are the *time saved* and the *cost avoided* by air travelers who use that airport over the nearest alternative airport. The procedure for measuring the value of time saved and cost avoided requires that one first identify a traveler's point of origin (O), the destination of the traveler (D), a designated airport (B) for arrival and departure, and the nearest alternative airport (A) for arrival and departure. It is assumed that the nearest alternative airport (A) is located at a farther distance from point O than the designated airport B (See Figure 2). The time saved by using airport B is the difference between the time for the O-A-D trip and the time for the more direct and shorter O-B-D trip.

The transportation benefit of airport B is the time saved per trip times the number of passenger trips, all multiplied by the value of the passengers' time (Butler and Kiernan 1992, 5). There is an additional transportation benefit as a result of reduced ground travel costs, since airport B is assumed to be closer to the origin of these trips than airport A. Finally, there can be additional benefits from air fuel savings, if flight distance x is shorter than flight distance y. The total transportation benefit is thus the sum of the time saving and travel cost reduction for all passengers using airport B, rather than airport A.

The variables that must be considered in the determination of transportation benefits are identified in Table 1. In most instances, typical or rule-of-thumb values can be utilized in calculations required by the DOT model. However, the critical variables that must be determined for an analysis of the transportation benefits accruing from a particular airport are:

FIGURE 2
Transportation Benefit of an Airport

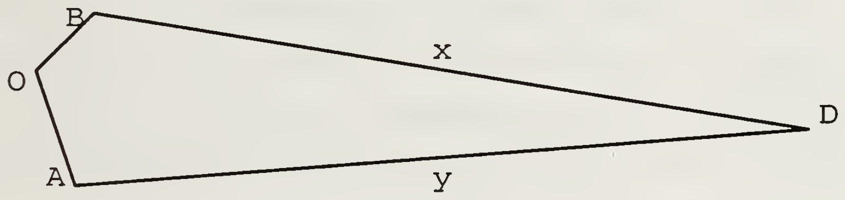


TABLE 1
TRANSPORTATION BENEFIT VARIABLES

Symbol	Variables	Value
G	Itinerant operations per based aircraft bper year[a]	302
N	Number of based aircraft at airport B	Variable
d	Ground access distance to airport B	Variable
E	Passenger time value ($/hour)[b]	$32.96
F	Number of passengers per trip per aircraft	Variable
P	Car Speed (m.p.h.)	45
Q	Car Cost, including amortization ($/mile)[c]	$0.372
b	Ground access distance to alternative airport A	Variable
Y	Annual passengers in commercial service	Variable

NOTES: [a]An operation is either a landing or a takeoff. Aircraft based at airports with air traffic control towers averaged 302 itinerant operations in 1985.

[b]The Federal Aviation Administration used $29.60 per hour as an estimate of the value of domestic airline passenger time in 1990. The author has adjusted this figure for inflation based on the U.S. Department of Labor, Bureau of Labor Statistics, *CPI: Detailed Report* (Washington, D.C.: Government Printing Office, August 1994), p. 70.

[c]The American Automobile Association estimates that a medium-sized automobile (4-6 cylinders), driven 15,000 miles per year, will cost $0.372 per mile to operate in 1994.

1. the access distances to the airports at A and B,
2. the number of passengers in commercial air service,
3. the number of based aircraft.

Once these variables are determined, the total transportation benefit from airport B may be calculated as follows:

Time Saved

Annual Passengers = $FGN + Y$

O-A-D Time = $b/P + y/S$

O-B-D Time = $d/P + x/S$

Annual Benefit = $E(FGN + Y)(b/P + y/S - x/S - d/P)$

Reduced Ground Travel Cost

Annual Ground Trips = $GN + Y$[4]

O-A-D Trip Costs = Qb

O-B-D Trip Costs = Qd

Annual Benefit = $(GN + Y)(Qb - Qd)$

Total Transportation Benefit

Where $x = y$

Total Annual Benefit = $E(FGN + Y)(b/P - d/P) + (GN + Y)(Qb - Qd)$.

To calculate current and potential transportation benefits accruing from the use of New Bedford Regional Airport, real values must be assigned to critical variables identified in the model. These values are assigned, explained, and applied below for various types of aviation activity, including current and potential aviation traffic at New Bedford Regional Airport.

5.20 The Current Transportation Benefit of Commuter Passenger Traffic

The current transportation benefit of commuter traffic enplaning at New Bedford Regional Airport is based on the real values assigned to critical variables as shown in Table 2. In assigning these values, the designated airport (B) is the New Bedford Regional Airport (see Figure 2). Destination (D) is Martha's Vineyard (MVY) and Nantucket (ACK), since all existing commuter air service from EWB is between those two locations (Edwards and Kelcey, 2-12). For air travelers originating within EWB's designated market area, Hyannis Municipal Airport is the next best alternative for air service to those destinations. The time saved by air travelers using EWB over HYA is the difference between the average time of an O-EWB-D trip and an O-HYA-D trip. The ground access distance to EWB is assumed to be 12.5 miles, i.e., the mean distance of travel from the midpoint of the designated market area to New Bedford Regional Airport. The ground access distance to HYA is assumed to be 30.0 miles, i.e., the mean distance of travel to Hyannis for passengers originating within EWB's designated market area. The air mileage and flight time for travel from the two airports is assumed to be equal, since actual

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[4] The DOT model recommends the assumption that each commercial passenger is traveling alone and requires a separate motor vehicle.

TABLE 2

Current Transportation Benefit Variables: Commuter Air Service

Symbol	Variables	Value
G	Itinerant operations per based aircraft per year (1993)[a]	2,122
N	Number of based aircraft at EWB[b]	2.8
d	Ground access distance to EWB (miles)	12.5
E	Passenger time value ($/hour)[c]	$32.96
F	Number of passengers per trip per aircraft	2.938
P	Car Speed (m.p.h.)	45
Q	Car Cost, including amortization ($/mile)[d]	$0.372
b	Ground access distance to alternative airport (HYA)	30.0
Y	Annual passengers in commercial service	17,457

NOTES: [a] Edwards and Kelcey (1994, 2-27) estimates a total 10,609 itinerant air taxi operations for 1993. However, the FAA includes both air freight and commuter airline service under air taxi operations, but does not disaggregate the two categories. Thus, a default figure of forty-percent (40%) has been used for estimating the proportion of air taxi operations attributalbe to air freight. This figure is consistent with the actual number of daily flights reported between EWB and the Islands.

[b] The number varies seasonally with four (4) based aircraft in the summer and two (2) based aircraft in the winter.

[c] The Federal Aviation Administration used $29.60 per hour as an estimate of the value of domestic airline passenger time in 1990. The author has adjusted this figure for inflation based on the U.S. Department of Labor, Bureau of Labor Statistics, *CPI: Detailed Report* (Washington, D.C.: Government Printing Office, August 1994), p. 70.

[d] The American Automobile Association estimates that a medium-sized automobile (4-6 cylinders), driven 15,000 miles per year, will cost $0.372 per mile to operate in 1994.

differences are quite small (i.e. five to ten minutes). In 1993, there were 17,457 enplanements from EWB to the identified destinations (Edwards and Kelcey 1994, 2-10).

The transportation benefit from the New Bedford Regional Airport's existing commuter air service is calculated as follows:

Time Saved

Annual Passengers = 2.938*2,122*2.8 + 17,457 = 34,914

O-A-D Time = (30.0/45) = .666 hours

O-B-D Time = (12.5/45) = .277 hours

Annual Benefit = (\$32.96*34,914)*.389 = \$447,647.74

Reduced Ground Travel Cost

Annual Ground Trips = (2,122*2.8) + 8,728.5[5] = 14,670.1

O-A-D Trip Costs = \$0.372*30.0 = \$11.16

O-B-D Trip Costs = \$0.372*12.5 = \$ 4.65

Annual Benefit = 14,670.1*(\$11.16 - \$4.65) = \$95,502.35

Total Transportation Benefit

Where x = y

Total Annual Benefit = \$447,647.74 + \$95,502.35 = **\$543,150.09**

5.30 The Current Transportation Benefit of General Aviation Traffic

The current transportation benefit of general aviation traffic enplaning at New Bedford Regional Airport is based on the real values assigned to critical variables as shown in Table 3.[6] In assigning these values, designated airport (B) is the New Bedford Regional Airport (see Figure 2). Destination (D) is an unknown variable for general aviation and, therefore, it is again assumed that flight time and distance are equal from EWB and the alternative airports (i.e., x = y). For air travelers originating within EWB's designated market area, Hyannis Municipal Airport and Providence Greene Airport are the next best equivalent alternative airports for general aviation.[7] The time saved by air travelers using EWB over HYA or PVD is the

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[5] The DOT model recommends the assumption that each commercial passenger is traveling alone and requires a separate motor vehicle. Nevertheless, because much of the Islands traffic is tourism, that assumption has been rejected as implausible. Instead, the number of motor vehicles is assumed to be total enplanements (17,457) divided by two (2) or 8,728.5

[6] General aviation is defined as all aviation activity except scheduled airline service and military aviation. The Federal Aviation Administration (1990) reports that in 1989 general aviation generated about \$42 billion of annual economic activity and provided about 537,000 jobs nationwide.

[7] Providence and Hyannis are considered "equivalent" alternatives to New Bedford because they are the two nearest airports with an Instrument Landing System runway.

TABLE 3
Current Transportation Benefit Variables: General Aviation Traffic

Symbol	Variables	Value
G	Itinerant operations per based aircraft per year[a]	300
N	Number of based aircraft at EWB	81
d	Ground access distance to EWB	10
E	Passenger time value ($/hour)[b]	$33.65
F	Number of passengers per trip per aircraft[c]	1.0
P	Car Speed (m.p.h.)	45
Q	Car Cost, including amortization($/mile)[d]	$0.372
b	Ground access distance to alternative airports (PVD, HYA)	20
Y	Annual passengers in general aviation service	24,300

NOTES: [a]An operation is either a landing or a takeoff. Aircraft based at airports with air traffic control towers averaged 302 itinerant operations in 1985. The DOT model recommends using a default value of 300 itinerant operations per aircraft when actual figures are unavailable.

[b]The Aircraft Owners and Pilots Association reports that the average annual income of its members was $62,800 in 1990 or $30.19 per hour. The author has adjusted this figure for inflation based on the U.S. Department of Labor, Bureau of Labor Statistics, *CPI: Detailed Report* (Washington, D.C.: Government Printing Office, August 1994), p. 70.

[c]GN, the number of annual itinerant general aviation operations is equal to the number of general aviation-related ground trips on the assumption that passengers making a general aviation trip together are acquainted and will share one automobile in travelling between the trip origin and the airport (Butler and Kiernan 1992, 9, fn. 1). Thus, the value of F is assumed to be 1.0, even though the actual value for EWB is estimated at 1.7.

[d]The American Automobile Association estimates that a medium-sized automobile (4-6 cylinderrs), driven 15,000 miles per year, will cost $0.372 per mile to operate in 1994.

difference between the average time of an O-EWB-D trip and an O-HYA-D trip or an O-PVD-D trip. The ground access distance to EWB is assumed to be 10 miles, i.e., the mean distance of travel for general aviation aircraft owners based at New Bedford Regional Airport.[8] The ground access distance to HYA and PVD is assumed to be 20.0 miles, i.e., the mean distance of travel to either Providence or Hyannis for aircraft operators originating within EWB's general aviation market area.

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[8] Edwards and Kelcey (1994, 4-3) determined the actual market for general aviation at EWB by an analysis of the addresses of the owners of general aviation aircraft based at the airport. This analysis reveals that 91.4% of general aviation aircraft owners live within a 20 mile radius of EWB.

The transportation benefit from the New Bedford Regional Airport's current general aviation traffic is calculated as follows:

Time Saved

Annual Passengers = (1*24,300) + 24,300 = 48,600

O-A-D Time = (20.0/45) = .444 hours

O-B-D Time = (10.0/45) = .222 hours

Annual Benefit = ($33.65*48,600)*.222 = $363,056.58

Reduced Ground Travel Cost

Annual Ground Trips = (300*81) + 24,300 = 48,600

O-A-D Trip Costs = $0.372*20.0 = $7.44

O-B-D Trip Costs = $0.372*10.0 = $3.72

Annual Benefit = 48,600*($7.44 - $3.72) = $180,792.00

Total Transportation Benefit

Where x = y

Total Annual Benefit = $353,056.58 + $180,792.00 = **$533,848.58**

TOTAL CURRENT TRANSPORTATION BENEFIT = $1,076,998.60

6.00 ECONOMIC IMPACTS

6.10 Definitions

Economic impacts measure the importance of aviation as an industry, primarily in terms of the employment and payroll generated by aviation activity. Economic impacts consist of direct impacts, indirect impacts, and induced impacts, and total impacts (Butler and Kiernan 1992, 13-17). *Direct impacts* are consequences of economic activities carried out at the airport by airlines, airport management, fixed based operators, and other tenants with a direct involvement in aviation; thus direct impacts are an immediate consequence of airport economic activity that would not have occurred in the absence of the airport. *Indirect impacts* derive primarily from off-site economic activities that are attributable to the airport. These activities include services provided by travel agencies, hotels, restaurants, and retail establishments. Indirect impacts differ from direct impacts insofar as they originate entirely off-site, although theoretically, the indirect impacts attributable to aviation activity should not have occurred in the absence of the airport. *Induced impacts* are the multiplier effects of the direct and indirect impacts. The are the increases in employment and incomes over and above the combined direct and indirect impacts that are created by successive rounds of spending.[9] *Total impacts* are the sum of the direct, indirect, and induced impacts.

6.20 Direct Economic Impacts

Data for measuring the direct economic impact of New Bedford Regional Airport was gathered through an employer survey (see Appendix A). Eleven employers are based on-site at New Bedford Regional Airport. It is estimated that these employers have seventy-eight (78) employees with a total annual payroll of $1,440,387.[10]

Airport employers also make an additional $828,613 in local expenditures for business services, aircraft and motor vehicle fuel, utilities, materials and equipment, and other items.

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[9] For example, most of the take-home income earned by airport employees is spent locally. Some of this spending becomes income to local individuals who provide services to airport employees. Some of the spending by airport employees goes to local businesses and becomes income to the business owners and their employees. Subsequently, part of these second-round incomes are also spent locally and thus become income to another set of individuals. Thus, as successive rounds of spending occur, additional income is created in the local area.

[10] Only a few employers failed to answer the survey. In those cases, highly conservative estimates were made based on the employment and payroll levels of comparable firms.

Since these expenditures are in turn sales (i.e., final demand) for items produced or distributed by other local businesses, it is possible to convert these expenditures into earnings and employment using the Regional Input-Output Modeling System (RIMS II) developed by the Bureau of Economic Analysis.[11] The earnings multipliers for a particular industry estimate the earnings which that industry pays, both directly and indirectly, to households employed in regional industries in connection with delivery of a dollar of output to final demand. The employment multipliers for a particular industry estimate the number of full- and part-time jobs that regional industries provide, both directly and indirectly, in order for the given industry to deliver $1 million of output to final demand (US Department of Commerce 1992, M-4).

The calculations based on RIMS II final-demand multipliers indicate that local expenditures by airport employers account for $601,491.24 in additional earnings and 23 additional jobs, primarily in business services, utilities, wholesale and retail trade (See Table 4).

Aviation activity at New Bedford Regional Airport accounts for **$2,041,878.20 in earnings and 101 full- and part-time jobs in direct regional economic impacts.**

TABLE 4
Airport Local Expenditures: Direct Economic Impacts, 1993

Expenditure	Amount	Final-Demand Multiplier		Earnings	Employment
		Earnings[a]	Employment[b]		
Services	$218,753	.8876	32.7	$194,165.16	7.16
Materials	$125,949	.8088	42.9	$101,867.55	5.41
Fuel	$442,479	.6707	23.5	$296,770.66	10.39
Utilities	$ 41,430	.2097	7.1	$ 8,687.87	.29
TOTAL	$828,611	N/A	N/A	$601,491.24	23.25

NOTES: [a] Each entry in this column represents the total dollar change in earnings in households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

[b] Each entry in this column represents the total change in number of jobs in all industries for each additional $1 million of output delivered to final demand by the industry corresponding to the entry.

SOURCE: Data on local expenditures derived from employer survey. Final-demand multipliers from U.S. Department of Commerce, *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)* (Washington, D.C.: Government Printing Office, 1992), p. 24.

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[11] Butler and Kiernan (1994, 24) note that at small airports "local expenditures may also be determined and added to the direct payroll impacts."

6.30 Indirect Economic Impacts

Indirect economic impacts are expenditures within the designated market area for off-site services related to the airport. The dominant off-site expenditures attributable to most airports are visitor expenditures for food, lodging, entertainment, local transportation, and related services. In most cases, visitor expenditures represent practically all of the indirect economic impacts attributable to an airport. Consequently, indirect impacts are typically measured based on the number of annual visitors times average visitor expenditures. However, EWB's aviation activity is currently limited to general aviation and commuter traffic to the Cape. Hence, the indirect impacts are likely to be negligible at the present time.

6.40 Induced and Total Economic Impacts

Induced impacts for airport-related businesses can be estimated by applying the RIMS II direct-effect multipliers to activities within the air transportation sector.[12] RIMS II multipliers are intended to show the total regional effects on industrial output, personal earnings, and employment for any county or group of contiguous counties in the United States resulting from a particular business activity (Butler and Kiernan 1992, C-1). The RIMS II total direct-effect multipliers estimate the *total* change in regional earnings and employment resulting from direct earnings and employment in a particular industry. Thus, the RIMS II total direct-effect multipliers implicitly capture induced effects which can be calculated as total impacts minus direct impacts.

The calculations based on RIMS II total direct-effect multipliers indicate that the induced impacts of airport-related employers account for an additional $1,426,048 in annual regional earnings and an additional eighty (80) full- and part-time jobs (See Table 5).

Thus, current aviation activity at New Bedford Regional Airport has a **total regional economic impact of $3,467,926 in payroll earnings, 181 full- and part-time jobs, and a total transportation benefit of $1,076,999.**

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[12] RIMS II multipliers have been used in a number of airport economic impact studies, see Applied Economics Associates, Inc. (1985); Environmental Science and Engineering (1984); Gellman Research Associates (n.d.); Roanoke Office of Economic Development (1986).

TABLE 5
New Bedford Regional Airport: Induced Impacts and Total Impacts, 1993

Total Direct-Effect Multiplier		Induced Impacts		Total Impacts	
Earnings[a]	Employment[b]	Earnings[c]	Employment[c]	Earnings[d]	Employment[e]
1.6984	1.7938	$1,426,048	80	$3,467,926	181

NOTES: [a] The entry in this column represents the total dollar change in earnings of households employed by all industries for each additional dollar of earnings paid directly to households employed by the air transportation industry.

[b] The entry in this column represents the total change in number of jobs in all industries for each direct job in the air transportation industry.

[c] Figures in these columns are Total Impacts minus Direct Impacts.

[d] Figure is derived from Direct Impact Earnings ($2,041,878) times total direct-effect earnings multiplier (1.6984).

[e] Figures is derived from Direct Impact Employment (101) times total direct-effect employment multiplier (1.7938).

SOURCE: Total direct-effect multipliers from U.S. Department of Commerce, *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)* (Washington, D.C.: Government Printing Office, 1992), p. 24.

7.00 POTENTIAL TRANSPORTATION BENEFITS

The potential transportation benefits of increased commuter and general aviation traffic at New Bedford Regional Airport are calculated below based on three possible scenarios:

- A *low-growth scenario* assumes that projected incremental growth in commuter passenger traffic to the Islands and projected incremental growth in general aviation traffic will occur at the levels forecast in the most recent Phase I Master Plan (Edwards and Kelcey 1994, 2-15). These forecasts assume that recent historical trends in commuter passenger and general aviation traffic at EWB will continue through 2013. This scenario forecasts that an additional 16,523 passengers will enplane at EWB for service to the Islands by 2013.
- A *moderate-growth scenario* assumes that EWB will experience incremental growth in its current commuter and general aviation traffic, while restarting limited commuter air service to New York City that recaptures the known market enplaning at EWB when this service was offered at EWB previously. The Phase I Master Plan forecasts that EWB will enplane an additional 10,194 passengers by recapturing its known New York City market (Ibid., 2-15).
- A *high-growth scenario* assumes that EWB can capture a significant portion of the southeastern Massachusetts market for air shuttle service to New York City that currently enplanes at Logan (BOS). Approximately 370,000 annual enplanements are generated to New York City from Logan's southeastern market area (Vanasse Hangen Brustlin, Inc. 1993). The Phase I Master Plan forecasts that 100,000 passengers annually would switch from BOS to EWB for convenience alone, if EWB is able to offer a low-cost, reliable, shuttle operation (Ibid., 2-15).

7.10 Potential Transportation Benefits: Low-Growth Scenario

The potential transportation benefit of commuter traffic enplaning at New Bedford Regional Airport is based on the real values assigned to critical variables as shown in Table 6.

TABLE 6

Potential Transportation Benefit Variables: Commuter Air Service, Low-Growth Scenario

Symbol	Variables	Value
G	Itinerant operations per based aircraft per year[a]	2,083
N	Number of based aircraft at EWB[b]	2.7
d	Ground access distance to EWB (miles)	12.5
E	Passenger time value ($/hour)[c]	$32.96
F	Number of passengers per trip per aircraft[d]	2.938
P	Car Speed (m.p.h.)	45
Q	Car Cost, including amortization ($/mile)[e]	$0.372
b	Ground access distance to alternative airports (HYA)	30
Y	Annual additional passengers in commuter service	16,523

NOTES: [a] An operation is either a landing or a takeoff. Aircraft based at airports with air traffic control towers averaged 302 itinerant operations in 1985. The DOT model recommends using a default value of 300 itinerant operations per aircraft when actual figures are unavailable.

[b] The forecast increase in commuter air traffic to the Islands is 94.6% of current traffic to the same destination. Assuming that similar-type aicraft continue to be used for these destintions, an additional 2.7 based-aircraft will be needed on average to accommodate the increased traffic.

[c] The Aircraft Owners and Pilots Association reports that the average annual income of its members was $62,800 in 1990 or $30.19 per hour. The author has adjusted this figure for inflation based on the U.S. Department of Labor, Bureau of Labor Statistics, *CPI: Detailed Report* (Washington, D.C.: Government Printing Office, August 1994), p. 70.

[d] GN, the number of annual itinerant general aviation operations is equal to the number of general aviation-related ground trips on the assumption that passengers making a general aviation trip together are acquainted and will share one automobile in travelling between the trip origin and the airport (Butler and Kiernan 1992, 9, fn. 1). Thus, the value of F is assumed to be 1.0, even though the actual value for EWB is estimated at 1.7.

[e] The American Automobile Association estimates that a medium-sized automobile (4-6 cylinders), driven 15,000 miles per year, will cost $0.372 per mile to operate in 1994.

The basic assumptions and assigned values are the same as those described in Section 3.20 except that the number of passengers, based aircraft, and itinerant operations are adjusted to reflect the projected incremental growth forecast by the Phase I Master Plan. The *additional* annual transportation benefit from the forecast growth in New Bedford Regional Airport's existing commuter air service is calculated as follows:

Time Saved

Annual Passengers = (2.938*2,083)*2.7 + 16,523 = 33,046

O-A-D Time = (30.0/45) = .666 hours

O-B-D Time = (12.5/45) = .277 hours

Annual Benefit = ($32.96*33,046)*.389 = $423,697.28

Reduced Ground Travel Cost

Annual Ground Trips = (2,083*2.7) + 8,261.5[13] = 13,885.6

O-A-D Trip Costs = $0.372*30.0 = $11.16

O-B-D Trip Costs = $0.372*12.5 = $ 4.65

Annual Benefit = 13,885.6*($11.16 - $4.65) = $90,395.26

Total Transportation Benefit

Where x = y

Total Annual Benefit = $423,697.28 + $90,395.26 = **$514,092.54**

7.20 Potential Transportation Benefits: Moderate-Growth Scenario

The potential transportation benefit of commuter air traffic enplaning at New Bedford Regional Airport for New York City is based on the real values assigned to critical variables as shown in Table 7. In assigning these values, the designated airport (B) is the New Bedford Regional Airport (see Figure 2). Destination (D) is New York City. For air travelers originating within EWB's designated market area, Boston Logan Airport (BOS) and Providence Greene Airport (PVD) are the next best alternatives for scheduled air service to New York City either by turboprop aircraft (i.e., commuter) or by small jet aircraft (i.e., shuttle). The average time saved by air travelers using EWB over PVD or BOS is the difference between the average time of an O-EWB-D trip and an O-PVD-D trip or O-BOS-D trip. The ground access distance to EWB is assumed to be 12.5 miles, i.e., the mean distance of travel from the midpoint of the designated market area to New Bedford Regional Airport. The ground access distance to PVD is assumed to be 18.0 miles, i.e., the mean distance of travel to Providence for passengers originating within the

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[13] The DOT model recommends the assumption that each commercial passenger is traveling alone and requires a separate motor vehicle. Nevertheless, because much of the Islands traffic is tourism, that assumption has been rejected as implausible. Instead, the number of motor vehicles is assumed to be total enplanements (16,523) divided by two (2) or 8,261.5

TABLE 7

Potential Transportation Benefit Variables: Commuter Air Service, Moderate-Growth Scenario

Symbol	Variables	Value
G	Itinerant operations per based aircraft per year (1993)[a]	1,200
N	Number of based aircraft at EWB[b]	2.8
d	Ground access distance to EWB (miles)	12.5
E	Passenger time value ($/hour)[c]	$32.96
F	Number of passengers per trip per aircraft	6.000
P	Car Speed (m.p.h.)	45
Q	Car Cost, including amortization ($/mile)[d]	$0.372
b	Ground access distance to alternative airport (PVD, BOS)	24.0
Y	Annual passengers in commercial service	10,194

NOTES: [a] An operation is either a landing or a take-off. Aircraft based at airports with air traffic control towers averaged 302 itinerant operations in 1985. The DOT model recommends using a default value of 300 itinerant operations per aircraft when actual figures ae unavailable. This figure applies mainly to larger airports. Instead, it is assumed that each commuter aircraft will make four itinerant operations (i.e., two take-offs and two landings) each day on 300 days per year.

[b] It is assumed that the Cessna 402 nine-passenger aircraft will be utilized on an EWB to New York City route. To enplane 10,194 passengers annually with an average load factor of 66% (i.e., six passengers each take-off) and each aircraft operating 300 days per year would require an additional 2.8 based aircraft. These assumptions would provide approximately three to four take-offs and landings each day of operation at EWB, depending upon how service was scheduled by the air carrier.

[c] The Federal Aviation Administration used $29.60 per hour as an estimate of the value of domestic airline passenger time in 1990. The author has adjusted this figure for inflation based on the U.S. Department of Labor, Bureau of Labor Statistics, *CPI: Detailed Report* (Washington, D.C.: Government Printing Office, August 1994), p. 70.

[d] The American Automobile Association estimates that a medium-sized automobile (4-6 cylinders), driven 15,000 miles per year, will cost $0.372 per mile to operate in 1994.

western half of EWB's designated market area. The ground access distance to BOS is assumed to be 30.0 miles, i.e., the mean distance of travel to Boston for passengers originating within the eastern half of EWB's designated market area. It is assumed that EWB will draw passengers equally from the two alternative airports and, therefore, an average ground distance of 24.0 miles [(18.0 + 30.0)/2] is used to calculate potential transportation benefits. The air mileage and flight time for travel from the three airports is assumed to be equal, since actual differences are quite small (i.e. five to ten minutes).

The *additional* annual transportation benefit from commuter air service from EWB to New York City is calculated as follows:

Time Saved

Annual Passengers = (6.000*1,200)*2.8 + 10,194 = 30,354
O-A-D Time = (24.0/45) = .533 hours
O-B-D Time = (12.5/45) = .277 hours
Annual Benefit = ($32.96*30,354)*.256 = $256,119.75

Reduced Ground Travel Cost

Annual Ground Trips = (3,360*2.8) + 10,194[14] = 19,602
O-A-D Trip Costs = $0.372*24.0 = $ 8.93
O-B-D Trip Costs = $0.372*12.5 = $ 4.65
Annual Benefit = 19,602*($8.93 - $4.65) = $83,896.56

Total Transportation Benefit

Where x = y
Total Annual Benefit = $256,119.75 + $83,896.56 = **$340,016.31**

7.30 Potential Transportation Benefits: High-Growth Scenario

The potential transportation benefit of shuttle air traffic enplaning at New Bedford Regional Airport for New York City is based on the real values assigned to critical variables as shown in Table 8. In assigning these values, the designated airport (B) is the New Bedford Regional Airport (see Figure 2). Destination (D) is New York City. For air travelers originating within EWB's designated market area, Boston Logan Airport (BOS) is the next best alternative for shuttle service to New York City. The average time saved by air travelers using EWB over PVD or BOS is the difference between the average time of an O-EWB-D trip and an O-BOS-D trip. The ground access distance to EWB is assumed to be 12.5 miles, i.e., the mean distance of

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[14] The DOT model recommends the assumption that each commercial passenger is traveling alone and requires a separate motor vehicle. The assumption is adopted in this case, since most commuter traffic between New Bedford and New York City likely to be business-related traffic.

TABLE 8

Potential Transportation Benefit Variables: Shuttle Air Service, High-Growth Scenario

Symbol	Variables	Value
G	Itinerant operations per based aircraft per year (1993)[a]	2,100
N	Number of based aircraft at EWB[b]	3.0
d	Ground access distance to EWB (miles)	12.5
E	Passenger time value ($/hour)[c]	$32.96
F	Number of passengers per trip per aircraft	32.00
P	Car Speed (m.p.h.)	45
Q	Car Cost, including amortization ($/mile)[d]	$0.372
b	Ground access distance to alternative airport (BOS)	40.0
Y	Annual passengers in commercial service	100,800

NOTES: [a] An operation is either a landing or a take-off. Aircraft based at airports with air traffic control towers averaged 302 itinerant operations in 1985. The DOT model recommends using a default value of 300 itinerant operations per aircraft when actual figures ae unavailable. Instead, it is assumed that each shuttle aircraft will make six (6) itinerant operations per day on 350 days per year.

[b] It is assumed that the Fokker-100 fifty-passenger aircraft will be utilized on an EWB to New York City shuttle route. To enplane 100,800 passengers annually with an average load factor of 64% (i.e., thirty-two passengers each take-off) and each aircraft operating 350 days per year would require an additional 3.0 based aircraft. These assumptions would provide approximately three take-offs and landings each day of operation at EWB, depending upon how service was scheduled by the air carrier.

[c] The Federal Aviation Administration used $29.60 per hour as an estimate of the value of domestic airline passenger time in 1990. The author has adjusted this figure for inflation based on the U.S. Department of Labor, Bureau of Labor Statistics, *CPI: Detailed Report* (Washington, D.C.: Government Printing Office, August 1994), p. 70.

[d] The American Automobile Association estimates that a medium-sized automobile (4-6 cylinders), driven 15,000 miles per year, will cost $0.372 per mile to operate in 1994.

travel from the midpoint of the designated market area to New Bedford Regional Airport. The ground access distance to BOS is assumed to be 40.0 miles, i.e., the mean distance of travel to Boston for passengers originating within EWB's designated market area. The air mileage and flight time for travel from the two airports is assumed to be equal, since actual differences are quite small (i.e. five to ten minutes).

The *additional* annual transportation benefit of shuttle service from EWB to New York City is calculated as follows:

Time Saved

Annual Passengers = (32*2,100)*3.0 + 100,800 = 302,400

O-A-D Time = (40.0/45) = .889 hours

O-B-D Time = (12.5/45) = .277 hours

Annual Benefit = ($32.96*302,400)*.612 = $6,099,867.60

Reduced Ground Travel Cost

Annual Ground Trips = (6,300*3.0) + 100,800[15] = 119,700

O-A-D Trip Costs = $0.372*40.0 = $14.88

O-B-D Trip Costs = $0.372*12.5 = $ 4.65

Annual Benefit = 119,700*($14.88 - $4.65) = $1,224,531

Total Transportation Benefit

Where x = y

Total Annual Benefit = $6,099,867.60 + $1,224,531 = **$7,324,398.60**

7.40 Potential Transportation Benefits: General Aviation Scenario

The potential transportation benefit of projected incremental growth in general aviation traffic at enplaning at New Bedford Regional Airport for New York City is based on the real values assigned to critical variables as shown in Table 9. In assigning these values, designated airport (B) is the New Bedford Regional Airport (see Figure 2). Destination (D) is an unknown variable for general aviation and, therefore, it is again assumed that flight time and distance are equal from EWB and the alternative airports (i.e., x = y). For air travelers originating within EWB's designated market area, Hyannis Municipal Airport and Providence Greene Airport are the next best equivalent alternative airports for general aviation.[16] The time saved by air travelers using EWB over HYA or PVD is the difference between the average time of an O-

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[15] The DOT model recommends the assumption that each commercial passenger is traveling alone and requires a separate motor vehicle. The assumption is adopted in this case, since most commuter traffic between New Bedford and New York City likely to be business-related traffic.

[16] Providence and Hyannis are considered "equivalent" alternatives to New Bedford because they are the two nearest airports with an Instrument Landing System runway.

TABLE 9

Potential Transportation Benefit Variables: General Aviation Traffic

Symbol	Variables	Value
G	Itinerant operations per based aircraft per year[a]	300
N	Number of based aircraft at EWB	26
d	Ground access distance to EWB	10
E	Passenger time value ($/hour)[b]	$33.65
F	Number of passengers per trip per aircraft[c]	1.0
P	Car Speed (m.p.h.)	45
Q	Car Cost, including amortization ($/mile)[d]	$0.372
b	Ground access distance to alternative airports (PVD, HYA)	20
Y	Annual passengers in general aviation service	7,800

NOTES: [a] An operation is either a landing or a takeoff. Aircraft based at airports with air traffic control towers averaged 302 itinerant operations in 1985. The DOT model recommends using a default value of 300 itinerant operations per aircraft when actual figures are unavailable.

[b] The Aircraft Owners and Pilots Association reports that the average annual income of its members was $62,800 in 1990 or $30.19 per hour. The author has adjusted this figure for inflation based on the U.S. Department of Labor, Bureau of Labor Statistics, *CPI: Detailed Report* (Washington, D.C.: Government Printing Office, August 1994), p. 70.

[c] GN, the number of annual itinerant general aviation operations is equal to the number of general aviation-related ground trips on the assumption that passengers making a general aviation trip together are acquainted and will share one automobile in travelling between the trip origin and the airport (Butler and Kiernan 1992, 9, fn. 1). Thus, the value of F is assumed to be 1.0, even though the actual value for EWB is estimated at 1.7.

[d] The American Automobile Association estimates that a medium-sized automobile (4-6 cylinderrs), driven 15,000 miles per year, will cost $0.372 per mile to operate in 1994.

EWB-D trip and an O-HYA-D trip or an O-PVD-D trip. The ground access distance to EWB is assumed to be 10 miles, i.e., the mean distance of travel for general aviation aircraft owners based at New Bedford Regional Airport.[17] The ground access distance to HYA and PVD is assumed to be 20.0 miles, i.e., the mean distance of travel to either Providence or Hyannis for aircraft operators originating within EWB's general aviation market area. Finally, the Phase I Master plan estimates that projected incremental growth in general aviation at EWB will result in additional twenty-six aircraft based at EWB by the year 2,013 (Edwards and Kelcey 1994, 4-5).

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[17] Edwards and Kelcey (1994, 4-3) determined the actual market for general aviation at EWB by an analysis of the addresses of the owners of general aviation aircraft based at the airport. This analysis reveals that 91.4% of general aviation aircraft owners live within a 20 mile radius of EWB.

The *additional* annual transportation benefit of shuttle service from EWB to New York City is calculated as follows:

Time Saved

Annual Passengers = (1.0*300)*26.0 + 7,800 = 15,600
O-A-D Time = (20.0/45) = .444 hours
O-B-D Time = (12.5/45) = .277 hours
Annual Benefit = ($33.65*15,600)*.167 = $87,664.98

Reduced Ground Travel Cost

Annual Ground Trips = (300*26) + 7,800[18] = 15,600
O-A-D Trip Costs = $0.372*20.0 = $ 7.44
O-B-D Trip Costs = $0.372*10.0 = $ 3.72
Annual Benefit = 15,600*($7.44 - $3.72) = $58,032.00

Total Transportation Benefit

Where x = y
Total Annual Benefit = $87,664.98 + $58,032.00 = **$145,696.98**

7.50 Summary of Potential Transportation Benefits

The potential transportation described throughout Section 5 are summarized in Table 10. The final benefits are cumulative and depend upon the combination of scenarios that actually transpire in the future. Table 11 summarizes the estimated number of based aircraft at EWB under various scenarios.

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[18] The DOT model recommends the assumption that each commercial passenger is traveling alone and requires a separate motor vehicle. The assumption is adopted in this case, since most commuter traffic between New Bedford and New York City likely to be business-related traffic.

TABLE 10
Summary of Potential Transportation Benefits

	Time Saved	Cost Avoided	Total
TRANSPORTATION BENEFIT			
Current Benefit			
Commuter Service	$447,647.74	$ 95,502.35	$543,150.09
General Aviation	$353,056.58	$180,792.00	$533,848.58
SUB-TOTAL	**$800,704.32**	**$276,294.35**	**$1,076,998.60**
Low	$423,697.28	$ 90,395.26	$514,092.54
General Aviation (Projected Growth)	$ 87,664.98	$ 58,032.00	$145,696.98
SUB-TOTAL	$511,362.26	$148,427.26	$659,789.52
CUMULATIVE	**$1,312,066.50**	**$424,721.61**	**$1,736,788.10**
Moderate	$256,119.75	$83,896.56	$340,016.31
CUMULATIVE	**$1,568,186.20**	**$508,618.17**	**$2,076,804.40**
High	$6,099,867.60	$1,224,531.00	$7,324,398.60
CUMULATIVE	**$7,668,053.80**	**$1,733,149.10**	**$9,401,203.00**

TABLE 11
Estimated Based Aircraft at New Bedford Regional Airport: Various Growth Scenarios

	Commuter	General Aviation	Total
Current Based Aircraft	2.8	81	83.8
Low/Incremental Growth	2.7	26	28.7
CUMULATIVE TOTAL	**5.5**	**107**	**112.5**
Moderate Growth	2.8	0	2.8
CUMULATIVE TOTAL	**8.3**	**107**	**115.3**
High Growth	3.0	0	3.0
CUMULATIVE TOTAL	**11.3**	**107**	**118.3**

NOTE: Figures do not include any aircraft that that might be based at EWB as a result of air cargo service.

8.00 POTENTIAL ECONOMIC IMPACTS

8.10 Definitions

The potential economic impacts of increased commuter and general aviation traffic at New Bedford Regional Airport are calculated below based on the three scenarios defined in Section 5.00. These scenarios are supplemented by two additional scenarios that include regional air freight cargo operations at based at New Bedford Regional Airport and the opening of a Wampanoag Indian casino operation in New Bedford.

8.20 Potential Direct Economic Impacts

The standard method for gathering data on direct economic impacts would be to conduct an employer survey. However, since the objective of this section is to estimate *potential* economic impacts accruing from the expansion of New Bedford Regional Airport, the standard method is unavailable for our purposes. There are two alternative methods for arriving at an estimate of potential economic impacts.

First, rule-of-thumb employment data included in the DOT standard model estimates that 650.5 new jobs are created for each additional one million passengers enplaning at large commercial airports, while one new job is created for each 7.2 based aircraft at general aviation airports (Butler and Kiernan 1992, 24). The first of these estimates is not applicable to New Bedford Regional Airport, except in a high growth scenario, since EWB otherwise does not qualify as a commercial airport within the model's definition. The rule-of-thumb estimate for general aviation traffic can be utilized to estimate the potential impact of projected incremental growth in general aviation traffic.

Second, it is possible to construct ratios of sales (i.e., final demand) to payroll and local expenditures for commuter air traffic using known figures on earnings and expenditures from the employer survey. These ratios can be projected against various scenarios based on estimated final demand. These projections are relatively simple, since most of the final demand created by airport expansion will consist of actual construction costs, ticket sales, and air freight cargo charges, while most of the impact from casino gaming operations will be the indirect impacts of visitor spending. This method is used to estimate the direct and induced impacts of increased commuter traffic, airport construction, air freight cargo traffic in combination with the RIMS II final demand multipliers and direct effect multipliers.

8.21 Direct Economic Impacts: Low-Growth Scenario, Commuter Air Traffic

The low growth scenario assumes that projected incremental growth in commuter passenger traffic to the Islands will add 16,523 enplaning passengers at New Bedford Regional Airport by 2013. The current price of a round-trip ticket from New Bedford to Martha's Vineyard is sixty-nine dollars ($69), which would generate additional total sales of $1,140,087.00. Using ratios developed from the employer survey, it is estimated that the low growth scenario in commuter air traffic will add $218,000 in annual air carrier payrolls and 14.6 new jobs among air carrier employers. Estimated local expenditure increases of $200,640 for fuel and business services will account for an addition direct impact of $141,492.69 in on-site annual earnings and 5.5 new jobs. Thus, total the low growth scenario in commuter air traffic will have total direct impacts of $359,492.60 in annual earnings and create an additional 20.1 new on-site full- and part-time jobs at New Bedford Regional Airport.

8.22 Direct Economic Impacts: Low-Growth Scenario, General Aviation Traffic

The low growth scenario also assumes that projected incremental growth in general aviation traffic will result in twenty-six additional based aircraft at New Bedford Regional Airport by 2013. The DOT standard model estimates that an additional one (1) new job is generated at a general aviation airport for each 7.2 general aviation aircraft based at the airport. This ratio generates an additional 3.6 new jobs at New Bedford Regional Airport and direct annual earnings of $109,577.61.[19]

Using ratios developed from the employer survey, it is estimated that projected incremental growth in general aviation traffic will generate additional local expenditures of $195,365 for fuel, business services, materials, and utilities. The estimated increase in local expenditures will account for an additional direct impact of $143,277.70 in on-site annual earnings and 5.6 new on-site jobs (See Table 12). Thus, the projected incremental growth in general aviation traffic will have total direct impacts of $252,855.31 in annual earnings and will account for 9.2 new on-site full- and part-time jobs at New Bedford Regional Airport.

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[19] Butler and Kiernan (1992, 24) estimate that jobs generated by aviation traffic paid an annual average of $29,000 in 1992. This figure has been adjusted for inflation using the U.S. Department of Labor, *CPI: Detailed Report*, August, 1994, 70.

TABLE 12

Airport Local Expenditures: Potential Direct Economic Impacts from Projected Incremental Growth in General Aviation Traffic

Expenditure	Amount	Final-Demand Multiplier		Earnings	Employment
		Earnings[a]	Employment[b]		
Services	$ 58,985	.8876	32.7	$ 52,355.09	1.90
Materials	$ 40,430	.8088	42.9	$ 32,699.78	1.70
Fuel	$ 82,651	.6707	23.5	$ 55,434.03	1.94
Utilities	$ 13,299	.2097	7.1	$ 2,788.80	0.09
TOTAL	$195,365	N/A	N/A	$143,277.70	5.63

NOTES: [a]Each entry in this column represents the total dollar change in earnings in households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

[b]Each entry in this column represents the total change in number of jobs in all industries for each additional $1 million of output delivered to final demand by the industry corresponding to the entry.

SOURCE: Data on local expenditures derived from employer survey. Final-demand multipliers from U.S. Department of Commerce, *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)* (Washington, D.C.: Government Printing Office, 1992), p. 24.

8.23 Direct Economic Impacts: Moderate-Growth Scenario, Commuter Air Service to New York City

The moderate growth scenario assumes that EWB will experience incremental growth in its current commuter and general aviation traffic, while restarting limited commuter air service to New York City that recaptures the known market enplaning at EWB when this service was offered previously. The Phase I Master Plan forecasts EWB will enplane an additional 10,194 passengers by recapturing its known New York City market by 2013. The current price of a round-trip ticket from Providence or Boston to New York City is two-hundred-fifty dollars ($250), which would generate additional total sales of $2,548,500. Using ratios developed from the employer survey, it is estimated that the moderate growth scenario in commuter air traffic to New York City will add $489,312 in annual air carrier payrolls and 32.6 new jobs among air carrier employers. Estimated local expenditure increases of $448,536 for fuel and business services will account for an additional direct impact of $316,310.36 in on-site annual earnings and 11.2 new jobs. Thus, total the moderate growth scenario in commuter air traffic will have total direct impacts of $805,622.36 in annual earnings and create an additional 43.8 new on-site full- and part-time jobs at New Bedford Regional Airport.

8.24 Direct Economic Impacts: High-Growth Scenario, Shuttle Air Service to New York City

The high growth scenario assumes that EWB can capture a significant portion of the southeastern Massachusetts market for air shuttle service to New York City that currently enplanes at Boston Logan Airport. The Phase I Master Plan forecasts that EWB will enplane an additional 100,000 passengers annually under this scenario. The current price of a round-trip ticket from Boston Logan Airport is $250, which would generate additional total sales of $25,000,000. Based on the DOT ratio of 650.5 new jobs for each one million passengers enplaned, it is estimated that the high growth scenario in shuttle air traffic will add $1,981,528.10 in on-site annual earnings and account for 65.1 new on-site jobs at New Bedford Regional Airport.[20]

8.25 Direct Economic Impacts: Air Cargo Service

The Phase I Master Plan for New Bedford Regional Airport envisions EWB as a regional center for air cargo service. The proposal to lengthen runways is tied partly to the runway requirements of air cargo carriers such as Federal Express. RIMS II final-demand multipliers are used to estimate the potential direct impact of air cargo activity at EWB. Final demand is determined by multiplying average freight carrying charges by the estimated air cargo loaded at EWB. It is estimated that EWB will on-load an average of 140,000 pounds of freight per month at an average charge of three dollars per pound. Final demand is $5,040,000 per year.

The application of RIMS II final-demand multipliers indicates that the estimated level air freight activity would have a direct economic impact of $3,816,792 in total annual earnings and create 154.2 new jobs.

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[20] Butler and Kiernan (1992, 24) estimate that jobs generated by aviation traffic paid an annual average of $29,000 in 1992. This figure has been adjusted for inflation using the U.S. Department of Labor, *CPI: Detailed Report*, August, 1994, 70.

8.26 Direct Economic Impacts: Construction and Airport Improvements

The cost of airport improvements proposed by the Phase I Master Plan are now estimated at $30 million, including environmental mitigation. Data generated by the United States Bureau of Labor Statistics, the United States Department of Transportation, and the Council of State Planning Agencies, indicates that each $1 billion in infrastructure-related construction spending generates 13,000 on-site jobs and 13,200 off-site jobs. This ratio yields an estimate of 390 on-site jobs and 396 off-site jobs from airport improvement construction with total annual earnings of $20,832,000 (Associated General Contractors of America 1983, 4; U.S. Department of Commerce 1992, 24)).

8.27 Direct Economic Impacts: Foreign Trade Zone

Aviation is an essential form of business transportation and, consequently, the presence of an airport and the types of service it provides are important considerations in the siting of many business and industrial facilities. Airports with commercial passenger service and air cargo service are magnets for hotels, office parks, warehousing, distribution centers, and other development. New Bedford Regional Airport has a designated Air Industrial Park and Foreign Trade Zone.

This report does not offer any estimates of the potential economic impacts that might accrue from the activation of EWB's Foreign Trade Zone. The Foreign Trade Zone Corporation of New Bedford issued a request for Proposals to "quantify the economic viability" of Foreign Trade Zone #28 in New Bedford with proposals due on July 22, 1994 (Foreign Trade Zone Corporation of New Bedford 1994, 1,5). The results of this report are expected in the near future.

8.30 Potential Indirect Economic Impacts

Indirect economic impacts are expenditures within the designated market area for off-site services related to the airport. The dominant off-site expenditures attributable to most airports are visitor expenditures for food, lodging, entertainment, local transportation, and related services. In most cases, visitor expenditures represent practically all of the indirect economic impacts attributable to an airport. Consequently, indirect impacts are typically measured based on annual visitor surveys. The Bristol County Convention and Visitors Bureau (BCCVB) collects such data in its annual conversion study. The BCCVB *1992 Conversion Study* estimates

TABLE 13

Daily Expenditure Per Travel Party to Southeastern Massachusetts, 1994 (est.)

CATEGORY	DAILY AVERAGE
Lodging	$ 54.56
Sightseeing, Recreation, Attractions, Amusements	$ 25.25
Meals	$ 35.62
Transportation	$ 18.19
Miscellaneous	$ 16.68
TOTAL	$150.30

SOURCES: Figures derived from data in Bristol County Convention and Visitors Burea, *Conversion Study, 1992*, (New Bedford, 1993, 5) and U.S. Department of Labor, *CPI: Detailed Report* (August 1994, 70).

that each travel party to southeastern Massachusetts spent $143.20 per day.[21] If adjusted for inflation, this number is $150.30 for 1994. The breakdown of these expenditures is provided in Table 13.

Indirect economic impacts from aviation activity at New Bedford Regional Airport are likely to be most significant if current plans for an Indian-owned casino come to fruition; hence, making EWB a destination airport for visitors, rather an airport of origin. The most recent estimate is that approximately one million visitors per year will be attracted to New Bedford and the southeastern Massachusetts area by the proposed casino. The type of casino proposed for New Bedford generally attracts visitors within driving distance of the casino who spend relatively little time outside the casino. However, the casino proposed for New Bedford also includes a theme park with amusements and rides designed to attract families and vacationers. Thus, if it is estimated conservatively that only 2% of the expected visitors arrive by air, the casino will generate 20,000 deplanements at EWB each year.[22] Moreover, the indirect effects of

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[21] The average travel party was 3.1 persons, i.e., 2.4 adults and 0.7 children.

[22] In 1992, 9% of visitors to southeastern Massachusetts came from New York, 10% from Pennsylvania, and 10% from the Midwest, see, Bristol County Convention and Visitors Bureau (1993, 2).

TABLE 14

Potential Indirect Economic Impacts of Casino Gambling Attributable to the New Bedford Regional Airport (Estimated 20,000 Annual Visitors)

Expenditure	Amount	Final-Demand Multiplier		Earnings	Employment
		Earnings[a]	Employment[b]		
Lodging	$352,021.10	.5970	34.3	$210,156.59	12.1
Sightseeing, Attractions	$162,912.96	.5970	34.3	$ 97,259.04	5.6
Meals	$229,820.16	.5809	38.2	$133,502.53	8.8
Transportation	$117,361.86	.7573	30.6	$ 88,878.14	3.6
Misc. Services	$107,619.61	.7113	35.7	$ 76,549.83	3.8
TOTAL	$969,735.60	N/A	N/A	$606,346.13	33.9

NOTES: [a] Each entry in this column represents the total dollar change in earnings in households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

[b] Each entry in this column represents the total change in number of jobs in all industries for each additional $1 million of output delivered to final demand by the industry corresponding to the entry.

SOURCE: Data on local expenditures derived from employer survey. Final-demand multipliers from U.S. Department of Commerce, *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)* (Washington, D.C.: Government Printing Office, 1992), p. 24.

this tourism may be attributed to the airport on the assumption that visitors arriving by air would not otherwise travel to the area for this purpose in the absence of air transportation.

The BCCVB conversion study indicates that 20,000 additional visitors to southeastern Massachusetts would generate 6,452 travel parties with each travel party spending $150.30 per day. Thus, if each travel party spends an average of three days in southeastern Massachusetts, the expected deplanements would generate an additional $969,735.60 in total sales or final demand. The economic impact of these deplanements is estimated in Table 14 by applying RIMS II final-demand multipliers to estimated tourist spending. These multipliers indicate that 20,000 annual deplanements would generate $606,346.13 in annual earnings and create 33.9 new jobs in lodging, amusements, restaurants, transportation, and miscellaneous services.

TABLE 15
Summary of Potential Direct and Indirect Economic Impacts

ECONOMIC IMPACTS	EARNINGS	EMPLOYMENT
Current Benefit	$2,041,878.20	101.0
Low Growth		
Commuter	$ 359,492.60	20.1
General	$ 252,855.31	9.2
SUB-TOTAL	$ 612,347.91	29.3
CUMULATIVE	**$2,654,226.10**	**130.3**
Moderate Growth	$ 805,622.36	43.8
CUMULATIVE	**$3,459,848.40**	**174.1**
High Growth	$1,981,528.10	65.1
CUMULATIVE	**$5,441,376.50**	**239.2**
Air Cargo	$3,816,792.00	154.2
CUMULATIVE	**$9,258,168.50**	**393.4**
Casino/Tourism (Indirect)	$ 606,346.13	33.9
CUMULATIVE	**$9,864,514.60**	**427.3**
Construction (Temporary, includes Indirect)	$20,832,000.00	786.0
CUMULATIVE	**$30,696,514.60**	**1,213.3**

8.40 Summary of Potential Direct and Indirect Impacts

The potential direct and indirect economic impacts of airport expansion as described throughout Section 6.2 and Section 6.3 are summarized in Table 15. The final impacts are cumulative and depend upon the combination of scenarios that actually transpire in the future.

8.50 Potential Induced and Total Economic Impacts

The potential induced impacts of the proposed airport expansion can be estimated for various scenarios by applying the RIMS II direct-effect multipliers to activities within the air transportation sector (See Table 16).

TABLE 16
New Bedford Airport Expansion: Summary of Induced and Total Economic Impacts

ECONOMIC IMPACTS	EARNINGS	EMPLO	MULTIPLIER		INDUCED IMPACTS		TOTAL IMPACTS	
			Earnings[a]	Employment[b]	Earnings	Employment	Earnings	Employment
Current Benefit	$2,041,878	101.0	1.6984	1.7938	$1,426,048	80.0	$3,467,926	181.0
Low Growth								
Commuter	$ 359,493	20.1	1.6984	1.7928	$ 251,070	15.9	$ 610,563	36.0
General	$ 252,855	9.2	1.6984	1.7928	$ 176,594	6.4	$ 429,449	15.6
SUB-TOTAL	$ 612,347	29.3			$ 427,664	22.3	$1,040,012	51.6
CUMULATIVE	**$2,654,226**	**130.3**			**$1,853,712**	**102.3**	**$4,508,938**	**232.6**
Moderate Growth	$ 805,622	43.8	1.6984	1.7928	$ 562,646	34.7	$1,368,268	78.5
CUMULATIVE	**$3,459,848**	**174.1**			**$2,416,358**	**137.0**	**$5,877,206**	**311.1**
High Growth	$1,981,528	65.1	1.6984	1.7928	$1,383,899	51.6	$3,365,427	116.7
CUMULATIVE	**$5,441,376**	**239.2**			**$3,800,257**	**188.6**	**$9,242,633**	**427.8**
Air Cargo	$3,816,792	154.2	1.6984	1.7928	$2,665,648	122.2	$6,482,440	276.4
CUMULATIVE	**$9,258,168**	**393.4**			**$6,465,905**	**310.8**	**$15,725,073**	**704.2**
Casino/Tourism (Indirect)	$ 606,346	33.9	1.9768	1.5976	$ 592,279	20.2	$1,198,625	54.1
CUMULATIVE	**$9,864,514**	**427.3**			**$7,058,184**	**331.0**	**$16,923,698**	**758.3**
Construction (Temporary, includes Indirect)	$20,832,000	786.0	2.2806	2.4101	$26,677,459	1,108.3	$47,509,459	1,894.3
CUMULATIVE	**$30,696,514**	**1,213.3**			**$33,735,643**	**1,439.3**	**$64,433,157**	**2,652.6**

NOTES: [a] Each entry in this column represents the total dollar change in earnings in households employed by all industries for each additional dollar of output delivered to final demand by the industry corresponding to the entry.

[b] Each entry in this column represents the total change in number of jobs in all industries for each additional $1 million of output delivered to final demand by the industry corresponding to the entry.

SOURCE: Direct-effect multipliers from U.S. Department of Commerce, *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)* (Washington, D.C.: Government Printing Office, 1992), p. 24.

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